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INTERNATIONAL BULLETIN
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DISCOVERIES AND CURRENT EVENTS *

SPAIN.

Tobacco Varieties Resistant to Ordinary Mosaic †

Investigations have been carried out since 1933 at the Station for Tobacco Studies at Santiponce, Seville, with a view to obtaining varieties of tobacco resistant to ordinary mosaic disease.

The starting point was the Colombian tobacco variety ' Ambalema ', discovered by Dr Nolla. It may be taken from his studies that this variety is resistant to types of ordinary mosaic, ' Nicotiana virus 1 ' (I. S. N. V.) and closely related viruses. In Spain, this variety is called ' Colombia '.

As this variety was unsuitable for cultivation, it was crossed with tobacco varieties grown more especially in Spain, such as the ' Valencia Alto ' and ' Valencia Bajo ', ' Filipino ', ' Maryland ' and ' Habano '.

Following the system of selection which has been adopted at the Station for Tobacco Studies, several generations were obtained by alternating cultivation in the open and under glass, without effecting any selection of the progeny. Namely, by collecting the seed of all the plants and keeping to the following genetic principle: it is all the more probable to meet homozygotic forms, by isolating specified plants resulting from a crossing, the greater will be the number of generations which will have followed, as heterozygotic plants give rise to homo- and heterozygotic plants while from homozygotic plants only homozygotic progeny descend when cross fertilization is not effected.

The war of liberation interrupted studies which were on the third generation in 1935, and the fourth generation which formed during the summer of 1936 was lost.

In the course of the summer of 1940 (the 1939 summer was also lost) a fourth generation was obtained by carrying out, for the first time, individual selection for resistance to mosaic, inoculating, with an appropriate technique not customary here, one by one all the plants of each lot of progeny and observing the results.

It was seen that there was no correlation between the development and vigour of the plants and their resistance to disease. The majority of the plants

* Under this and the third heading the countries are arranged in French alphabetical order.

† Communication from Sr. ENRIQUE ALCARAZ MIRA, Agricultural Engineer, Director of the Station for Tobacco Studies, Santiponce, Seville, transmitted by the official correspondent of the International Institute of Agriculture, Sr. JOSÉ DEL CAÑIZO, Agricultural Engineer and Bachelor of Natural Science, Station of Phytopathology, Madrid, Spain.

were susceptible, only a few were resistant, but these were not the best. The seeds of these latter plants were harvested separately.

It was a question then of ascertaining whether the character of resistance in the isolated plants was transmitted uniformly to all the progeny. That is to say, whether plants had been obtained which already incorporated the factor or factors of resistance with a homozygotic character. This was realized with an auxiliary generation raised under glass during the winter of 1940-41. The results were fairly good, since out of the 28 progeny studied 17 were uniformly resistant, the others were rejected as being of doubtful resistance or undisguishedly susceptible.

A step forward was made last summer by raising, in the open, a generation from the same mother plants isolated the previous summer (no seed from the auxiliary greenhouse generation was kept).

With this generation raised in the open (the fifth since the initial crossing) it was possible to study and confirm not only the resistance to mosaic disease under normal conditions of growth of the different progeny, but also the uniformity of development and characteristics of the various strains isolated. Some of these, by their homogeneity, may be considered as pure strains, constituting so many new varieties resistant to mosaic disease. The following are the most important:

Hybrid 57 A. Resistant (' Colombia ' × ' Valencia Alto '). Plant of cylindrical aspect and very incurvated, narrow and pointed leaves; flowers pink in colour; it attains a height of about 1.30 m. and bears 22 to 23 leaves; the average-sized leaf has approximately the following dimensions: 60 × 20 cm. After curing the tobacco has a fine colour and good aroma, its combustibility is satisfactory, and has a definitely strong flavour.

Hybrid 57 B. Resistant (' Colombia ' × ' Valencia Alto '). This is another homogeneous strain isolated from the same cross having very similar characteristics both in the field and after curing. The leaf, however, is slightly broader.

Hybrid 60. Resistant (' Colombia ' × ' Filipino '). Plant of tall cylindrical aspect, leaves narrow and tenuous, colour light green, loose inflorescence with flowers of a deep pink colour; the plant attains an average height of 1.35 m. and bears from 18 to 19 leaves of which the medium-sized measure about 46 × 17 cm. The prepared and cured tobacco is of a fine bright colour, with a relatively mild and aromatic taste and fairly good combustibility.

We have placed considerable hopes on this last hybrid, because besides being resistant to mosaic disease, a relative fineness and quality of the leaf like that of the original ' Filipino ' has also been obtained.

The two hybrids 57 do not appear to be so good, but they greatly resemble, in leaf characteristics, the first generation of the cross, the influence of ' Colombia ' being very marked. It may be noted that, from the standpoint of yield, all the hybrids proved excellent.

At present investigations are being continued with the object of obtaining hybrids equally resistant but with better quality leaves, using the technique of recrossing with the ameliorating variety susceptible to mosaic, and by crossing hybrids already obtained with others having broader leaves and higher yields, resulting from crossing varieties of the country with others of Central Europe, already stabilized. The F_2 generation of these crosses is now being studied.

ITALY.

Further Damage Caused by the Indian Meal Moth (*Plodia interpunctella*) and the Angoumois Grain Moth (*Sitotroga cerealella*) *

In a fruit warehouse at Bolzano I found fresh apples and pears attacked by caterpillars which, on examination, I recognized as belonging to the cosmopolitan species *Plodia interpunctella* Hb. wihch devours, as is well known, the greater part of the dry or desiccated food stores of man and domestic animals.

Having studied for several years since 1924 the habits of *Pl. interpunctella* in insular, southern and northern Italy, I considered and was even quite convinced that it could not attack fresh fruits just harvested. I was therefore very surprised to see such a rapid development of this moth which, for the first time in 1929, I called the wheat striped moth.

It has now been found that each fresh apple or pear may be attacked by several larvae of the microlepidopter and destroyed in a few days.

This new instance adds still further to the extent of destruction of *Pl. interpunctella* very common throughout Italy and which damages such a large quantity of our food supplies.

* * *

From the biological observations carried out on the Angoumois grain moth (*Sitotroga cerealella* Ol.) in Northern and Southern Italy, it was found that normally, 4 to 5 generations a year occurred in the South and 3 to 4 in the North, damaging barley, wheat, rye, maize, oats, rice, sorghum, millet and canary-grass.

Seeds which have never been mentioned by any investigator as hosts of the Angoumois grain moth were attacked. For example, three complete generations were produced in dried and hulled chestnuts in a year and the same occurred with caryopses of *Lolium* sp.

Also three generations in a year hatched out on red bean and 4 on buckwheat which is much sought after and appreciated by the Angoumois grain moth in the Venezia Tridentina region.

The females of the first generation laid, in Southern Italy, an average of 150 to 160 eggs with a maximum of 200, while in Northern Italy, the average for each female was found to be 100 eggs, the maximum being 150. With the successive generations, the number of eggs laid decreased in general by 15 to 20 per cent. and even more.

Although the breeding capacity is higher in Southern Italy, the damage caused by this moth in Northern Italy is also very severe as the activity of its natural enemies is very reduced.

* Communication from Prof. GIUSEPPE SALVATORE CANDURA, Director of the Royal Observatory, Bolzano, transmitted by the Royal Station of Plant Pathology, Rome, official correspondent of the Institute.

It was observed when attacking the new early wheats (particularly 'Ardito' and 'Mentana') that the larva of the Angoumois grain moth may come out of one grain and enter into another, contrary to what was thought until now, and consequently cause very considerable damage owing to the food requirements of the insect.

After six years' studies the value from the economic and technical standpoint, of the use of a new control method, both preventive and curative, has been confirmed. This method consists in dusting the grain with 2 to 3 per cent. fossil farina in impalpable powder.

VARIOUS QUESTIONS

Copper and Sulphur Substitutes for the Control of Cryptogamic Diseases of Plants *

The present shortage of copper sulphate and sulphur for the control of the more dangerous diseases of the vine, the potato and many other plants make it both necessary and pressing to have recourse to substitutes.

There is no want of antiseptics and those concerned have not awaited the present difficult times to make some attempt to utilize them. Most of the antiseptics, especially the active types, however, are not suitable as they destroy the leaves. It is towards the mineral elements that attention should be turned for effectual assistance. Iron, zinc, manganese, nickel, cobalt, etc. have been tried not without success; and it is possible that copper only enjoys such exclusive favour because chance brought it to the fore.

In considering this list of substitute elements, it is surprising to note that the majority of them are plant nutrients. It appears, therefore, that this property also intervenes in the degree of efficacy of antiseptic preparations. A compound injurious to parasites which at the same time may give more vigour to the plant, asserts itself at first sight as the ideal remedy.

All wine-growers agree in recognizing that copper sulphate treatment accentuates the green colour of the leaves and increases the vigour of the plant. It is possible, in fact, that copper is an element indispensable to the vine, although this has not be proved experimentally; it has been established, however, that sulphur intervenes directly in the chemical changes which are connected with the chlorophyll function; consequently, it is necessary to this function and promotes the development of the green pigment, although it does not enter into its composition. As iron possesses the same property, it is iron sulphate which first commands the attention of experts.

Zinc and manganese are also nutrients of the vine, and very likely aluminium.

* Communication from Professor PIERRE MAZÉ, Departmental Head at the Pasteur Institute, Paris, France.

It is obvious therefore, that the study of the anticryptogamic properties of these elements should be renewed, elements which, apart from manganese, nickel and cobalt, are not so scarce at the present moment as copper.

It is probable that an element as active and perhaps even more active than copper will be found and which will not present the same disadvantage in the case of the potato, as not all potato varieties tolerate copper preparations to the same extent.

The mode of action of copper sulphate does not exclude this hope. Practice has, in fact, established two essential facts:

(1) The application of copper sulphate is a preventive treatment; it has no effect on the mycelium which penetrates into the parenchyma of the leaf, the destruction of this mycelium is, I recall, the indirect work of the sun.

(2) The presence of a trace of copper dissolved in rain water or in dew which moistens the leaf suffices to prevent the germination of the conidia of downy mildew of the vine (*Plasmopara viticola* [Berk. et Curt.] Berl. et De Toni) and consequently, infection of the plant. It is even affirmed that a mixture containing a millionth part of dissolved copper is sufficient to protect the leaf. This fact seems paradoxical when it is known that copper is not very toxic for cultures of *Plasmopara* in artificial media, and also for the mycelium which penetrates into the parenchyma where it finds its nutrient medium, as it should not be thought that copper does not penetrate into the foliar sap.

There, however, it is a question of a general fact; monomolecular solutions of elements, even nutrient, possess marked abiotic properties.

A maize seedling grows poorly and rapidly dies off in a 1 per 50,000 solution of ferrous sulphate, while it will grow for a whole season in distilled water, developing roots of surprising length and extreme tenuity.

This essential fact should not be lost sight of in the preparation of fungicide solutions; the addition of gelatine, sugar, molasses, even soap, products generally very impure, make the mixtures compare with nutrient media and reduce their antiseptic capacity appreciably. The mixtures lose in efficacy what they may gain in adhesiveness. Their adhesive power is assured by other means.

There are three types of mixtures—acid, neutral and alkaline. In order to prepare them properly, reagents must be used, litmus paper or better, phenolphthalein. Wine-growers do not bother much about using reagents; they have long experience and frequently trust to the eye, which does not prevent them from obtaining equally one or the other mixture; it is the colour of the clear liquid which guides them most; the alkaline mixture on clarifying gives a deeper blue liquid.

All naturally contain a precipitate of copper oxide and lime sulphate, the abundance of which depends on the quantities of sulphate and lime employed. What is important, from the practical standpoint, is to use them in proportion as they are prepared. They constitute very instable systems which do not cease to flocculate, the colloidal hydrates changing into pulverulent substances.

The rôle of the colloidal hydrates is to act as glue, and it is through them that the mixtures are able to adhere to the leaves. The particles in suspension add to this property; they add a liquid film which increases the quantity of hydrate deposited on the leaf, and the use of very fine inert powders such as finely powdered

clay, is a sensible practice in this sense, that it augments the adhesiveness of mixtures of weak concentration.

In speaking of colloidal hydrates, it is not known exactly what they are. Chemists are not in agreement as regards the soluble or colloidal compounds which form in copper mixtures close to neutral point with phenolphthalein. Experience has established the adhesive power of each type of mixture and this is what counts in practice.

Of the three Bordeaux mixtures employed, the neutral type adheres best to the leaves.

Treated in the same way as with copper sulphate, the substitute sulphates give complexes similar to those of copper sulphate, they will be prepared in the same manner as the cupric mixtures.

Sulphur, for its part, is becoming scarce on the market. Employed against vine-mildews in general, it more or less is as useful in wine-growing as copper sulphate.

Sulphur is an insoluble substance which itself possesses no antiseptic property. Its slow oxidation in the open air liberates sufficient quantities of sulphurous acid, it is supposed, to check promptly attack at the beginning, effective also against advanced disease.

Sulphur, therefore, may be replaced by a sulphite; this is not advisable, if sulphur has prevailed, it is undoubtedly because sulphurous acid is injurious to the plant; the sulphite can only be employed in a very dilute solution. Its admixture with Bordeaux mixture has been tried; introduced into a very slightly acid mixture, it should maintain its efficacy provided that the sulphurous acid is the only active factor brought into use by the oxidation of the sulphur, provision prompted by the curative action of permanganate which is an energetic oxidant.

The curative action against Oidium of permanganate of potash is also applied in practice. This compound is of evident interest as the manganese and potassium are nutrients of the vine as also of all plants. To its antiseptic action, therefore, are added its nutritive qualities capable of giving greater vigour to the plant and consequently, greater resistance to parasitic fungi. It may be used at a concentration of 1 to 2 gm. per litre of water.

Permanganate does not tolerate the presence of other impure compounds containing reducing substances or organic matter. However, it may be mixed with very finely powdered or, if necessary calcined clay; the rôle of kaolin is to increase the adhesiveness of the permanganate and to protect it against total absorption by the leaf. For the latter reason, permanganate treatments should be repeated even in dry weather; oidium, in fact, is a fungus, the mycelium of which lies on the outside of the plant, only the suckers sent out by the mycelium penetrating into the surface cells.

It is likely, therefore, that substitute products for copper and sulphur are not wanting and it may be anticipated that preparations just as effective and just as practical as copper sulphate and sulphur will be discovered. The agricultural stations and agronomic laboratories placed in the wine-growing regions are qualified to perfect these substitute products.

LEGISLATIVE AND ADMINISTRATIVE MEASURES

Germany. — A Decree of August 14, 1942 modifies the provisions regulating the modalities of the Decree of February 2, 1941 relative to the use of the preparation ' Tritox ' in the control of plant and animal pests [see this *Bulletin* 1941, No. 5, p. 95]. A form is appended to serve for the wording of the certificate of authorization for the use of the preparation ' Tritox '. (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. Dezember 1942, Bd. XIV, Nr. 5, S. 114-115).

*** By Ordinance dated September 25, 1942, the regulations relative to the trade in potatoes laid down by Ordinance No. 8 of June 20, 1935 [see this *Bulletin* 1935, No. 9, p. 205] and modified by Ordinance of January 10, 1939 [see this *Bulletin* 1939, No. 5, p. 110] have again been modified and adapted to present railway transport conditions. (*Ibid.*, S. 116-117).

*** By Ministerial Provision of October 29, 1942, superseding that of November 7, 1941 [see this *Bulletin* 1942, No. 2, p. 23], the importation of carnations (cut flowers) from Italy, Denmark and the Netherlands is authorized beginning from November 15, 1942. (*Nachrichtenblatt für den Deutschen Pflanzenschutzdienst*, Berlin, Anfang Dezember 1942, 22. Jahrg., Nr. 12, S. 82).

*** A Circular, dated November 17, 1942, furnishes modifications of an administrative order to the Decrees of August 25, 1938 and February 2, 1941 relative to the use of ethylene oxide [see this *Bulletin* 1939, No. 2, p. 28 and 1941, No. 5, pp. 94-95]. A new example of the certificate to be issued to persons having requested authorization to employ ethylene oxide for disinfection purposes is appended to the Circular. (*Amtliche Pflanzenchutzbestimmungen*, Berlin, 1. Dezember 1942, Bd. XIV, Nr. 5, S. 112-114).

Germany (Alsace). — By Ordinance of November 5, 1942, the use of very poisonous substances for the control of parasites is regulated according to the provisions adopted in the Reich. A list of the provisions in question is given (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. Dezember 1942, Bd. XIV, Nr. 5, S. 119-121).

Germany (Protectorate of Bohemia and Moravia). — Decree No. 334 of September 17, 1942 furnishes an amendment to the Decree dated July 17, 1925 relative to the control of the potato wart disease (*Synchytrium endobioticum*), modified by the Decrees of February 22, 1940 and March 6, 1941 [see this *Bulletin* 1940, No. 9, p. 166 and 1941, No. 11, p. 206 respectively]. (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. Dezember 1942, Bd. XIV, Nr. 5, S. 125-126).

*** Notification No. 1045 of November 13, 1942 authorizes the use, for the duration of the period from November 1 up to March 31, of phosphoric bait for the destruction of crows, magpies and jays. (*Ibid.*, S. 128).

*** In Notification No. 1073, dated November 24, 1942, the Minister of Agriculture publishes, a new list of the localities which, for a period of 10 years, will be considered as ' prohibited zones ' owing to the actual, suspected or nearby presence of wart disease (*Synchytrium endobioticum*). The introduction into the prohibited zone of potato varieties not resistant to wart disease is interdicted. Cultivation of varieties other than those resistant to wart disease is also prohibited. Notification No. 463 of February 24, 1941 [see this *Bulletin* 1941, No. 11, p. 206] is abrogated. (*Ibid.*, S. 126-127).

Germany (Lorraine). — By two Ordinances dated July 30, 1942, plant protection, parasite control and the measures aiming at preventing the introduction of animal and plants pests are regulated according to the provisions adopted in the Reich. The provisions in question are indicated in detail. (*Amtliche Pflanzenbestimmungen*, Berlin, 1. Dezember 1942, Bd. XIX, Nr. 5, S. 121-123).

*** An Ordinance of September 10, 1942 makes some modifications in the provisions of May 13, 1941 [see this *Bulletin* 1941, No. 10, p. 187] with a view to facilitating the destruction of crows and magpies. (*Ibid.*, S. 124).

Germany (Occupied Eastern Territories). — A Decree of September 16, 1942 regulates all question regarding disinfection establishments. (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. Dezember 1942, Bd. XIV, Nr. 5, S. 124-125).

Italy. — Ministerial Circular No. 70, dated October 13, 1942, confirms the necessity of capturing sparrows and starlings in order to protect sowings. (*Bollettino Ufficiale del Ministero dell'Agricoltura e delle Foreste*, Roma, 1-11 novembre 1942, anno XIV, nn. 31-32, pp. 1925-1926).

*** Ministerial Decree of November 28, 1942 declares the territories of all the wine-growing communes of Arezzo Province infested with grape phylloxera. (*Gazzetta Ufficiale del Regno d'Italia*, Roma, 31 dicembre 1942, anno 83°, n. 309, p. 5165).

*** By Ministerial Decree, dated November 28, 1942, the territories of the communes of Sorrento, Massalubrense, Mondragone and Casalnuovo of Naples Province have been declared attacked by grape phylloxera. (*Ibid.*).

*** By Ministerial Decree of December 9, 1942 the wild rabbit has been included among the noxious animals of the territory of Capraia Island. (*Ibid.*, 18 dicembre 1942, n. 299, p. 5015).

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